



# STUDENT ROBOTICS 2022

VIRTUAL KICKSTART

# KICKSTART 2022

1. What is Student Robotics
2. Schedule for the year
3. Designing your robot
4. Building your robot
5. Developing your robot
6. Health and safety
7. The game
8. The microgames



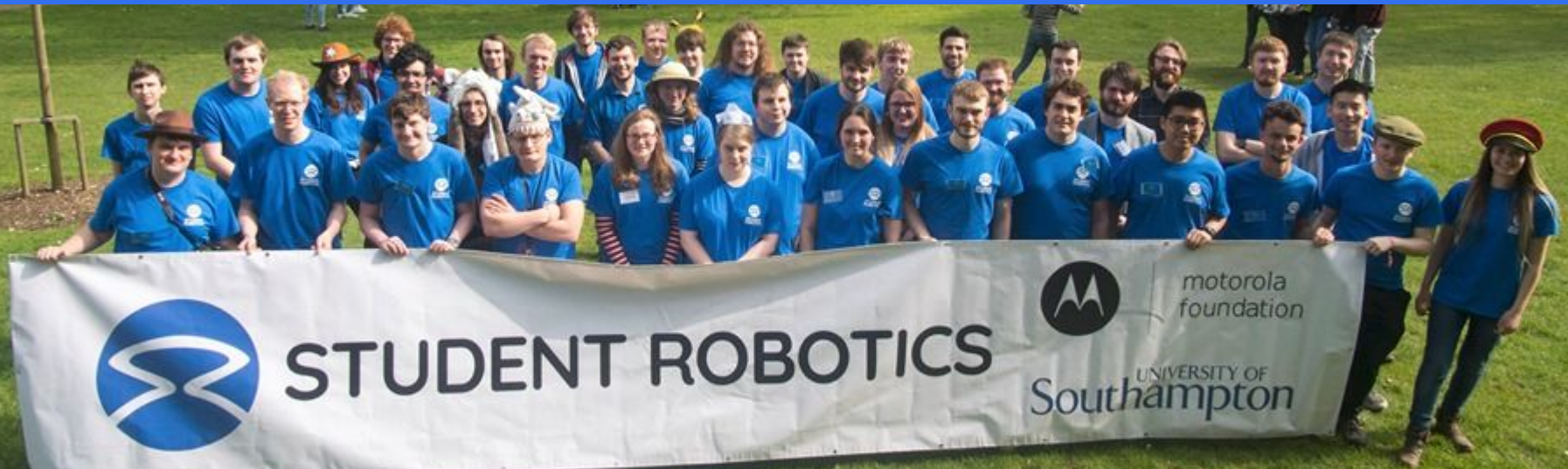
QUESTIONS 🙋

**WHAT IS STUDENT  
ROBOTICS?**



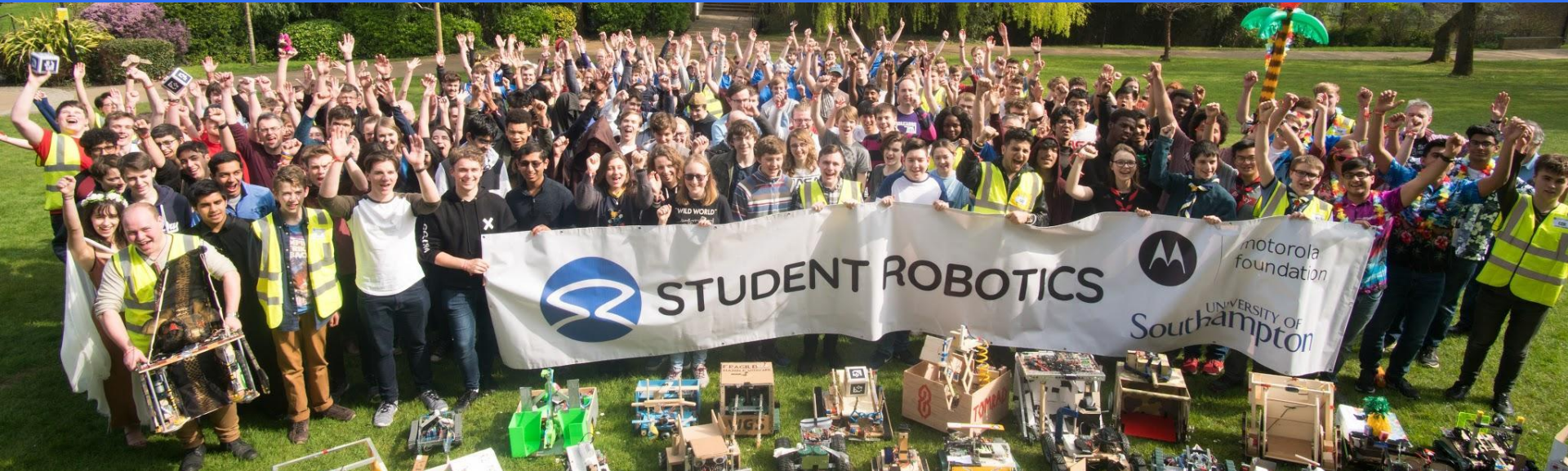
# The Volunteers

We're here to help!

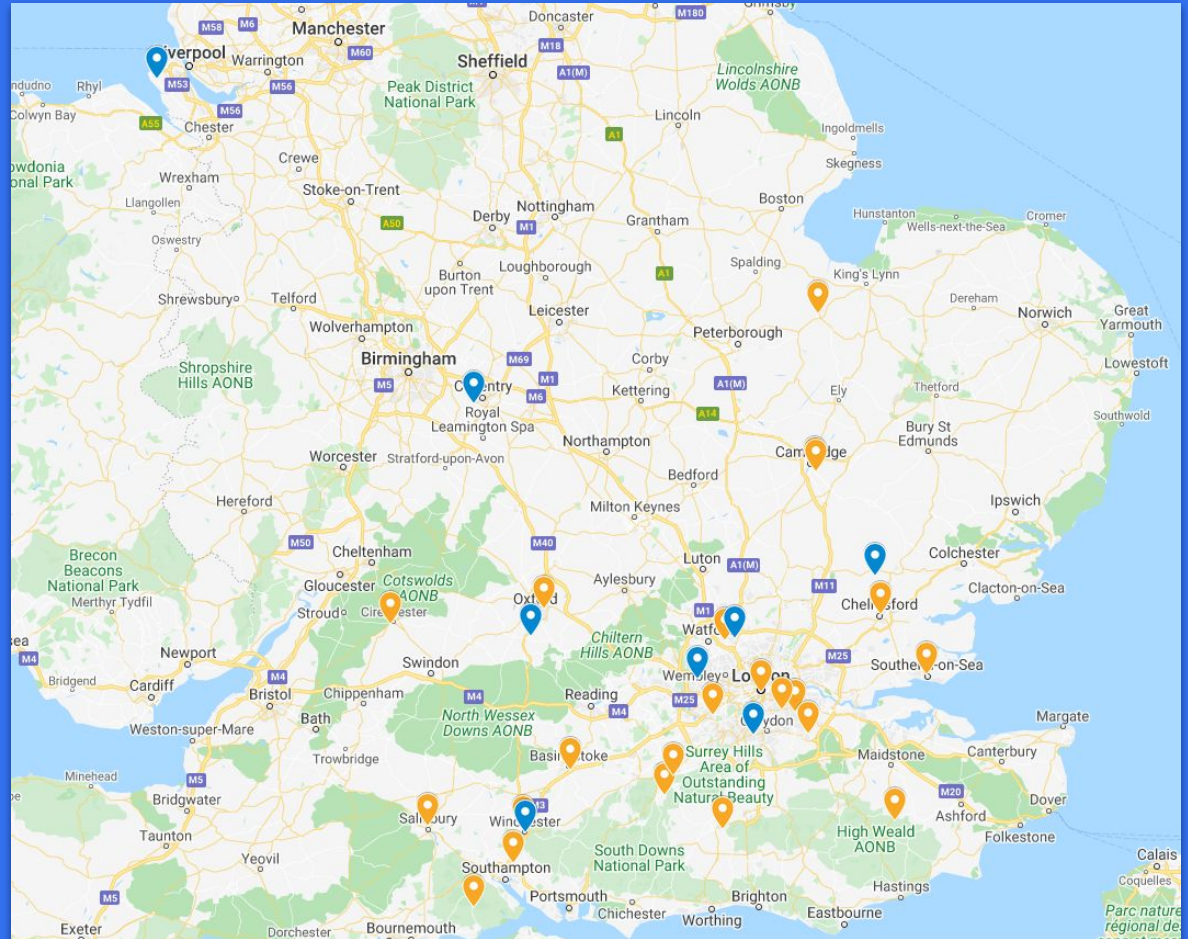


# The Teams

There's 31 of you!



# Where are you all?

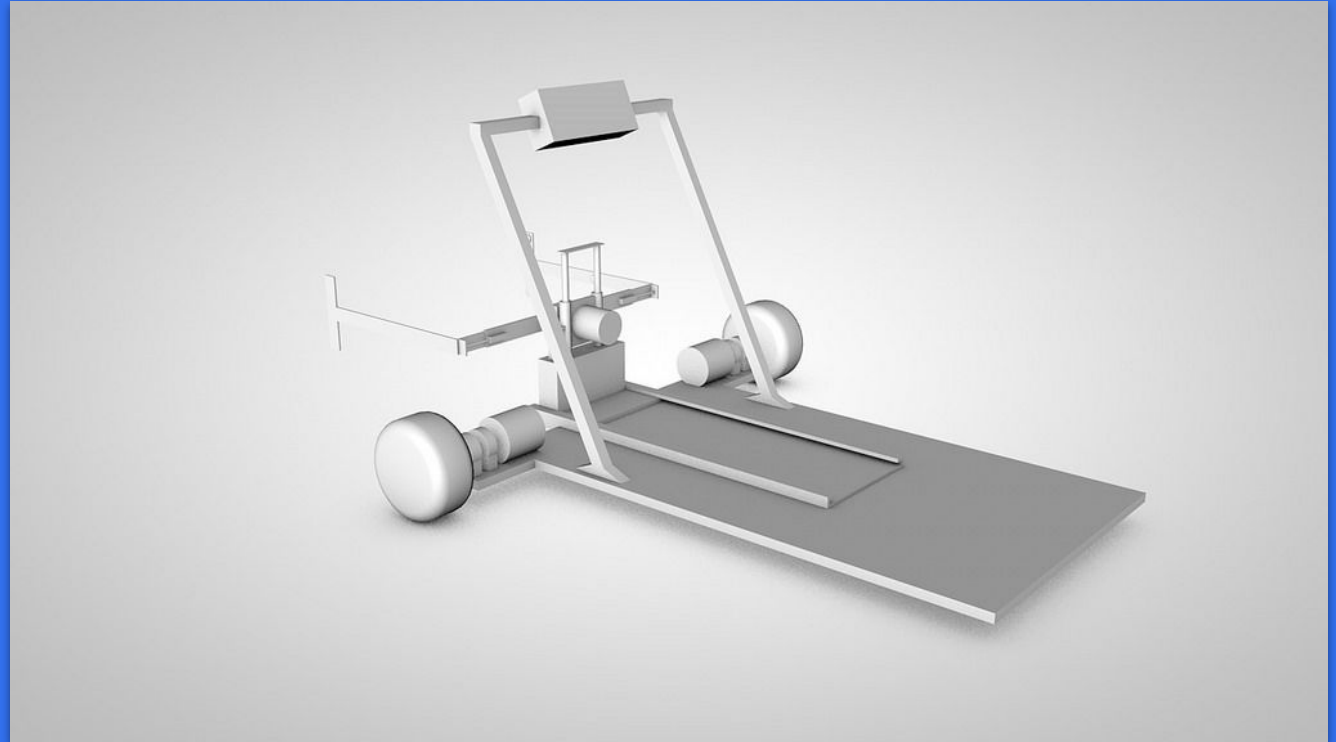


# 5 MONTHS

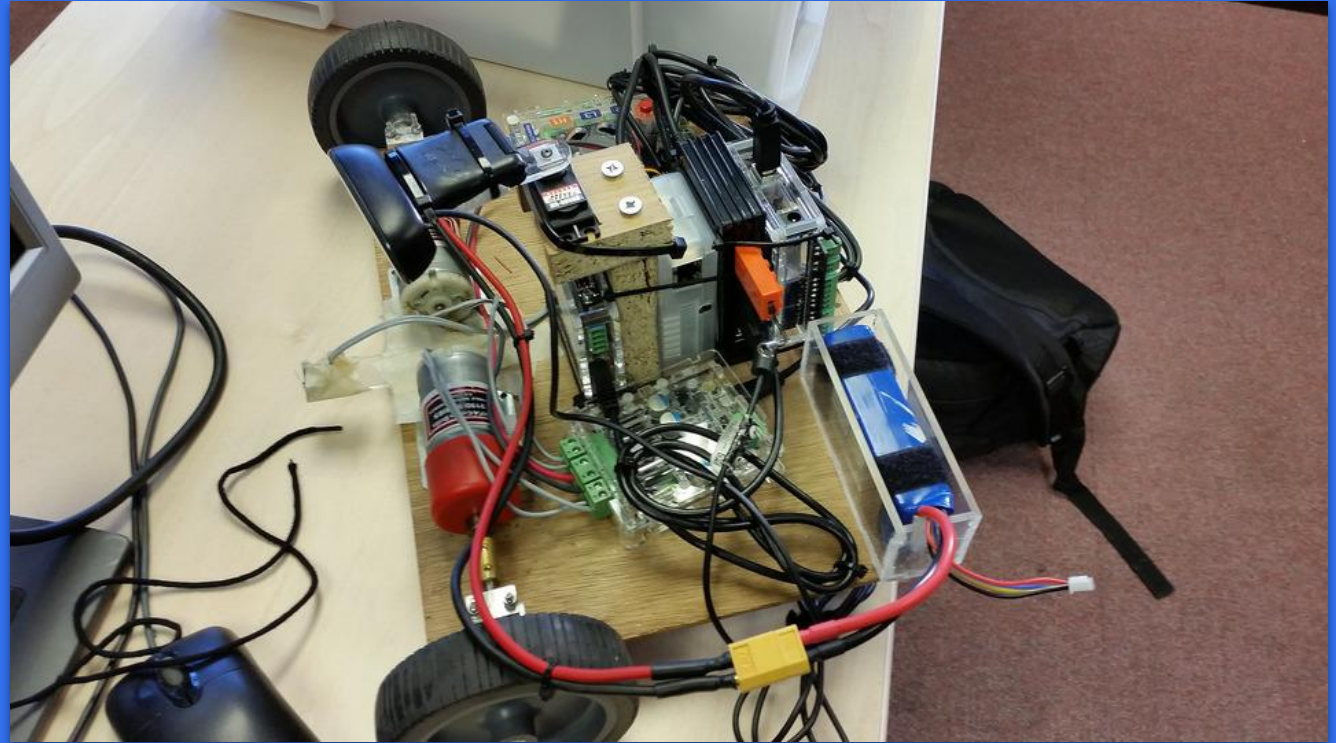
You have **ONLY** 5 months to...



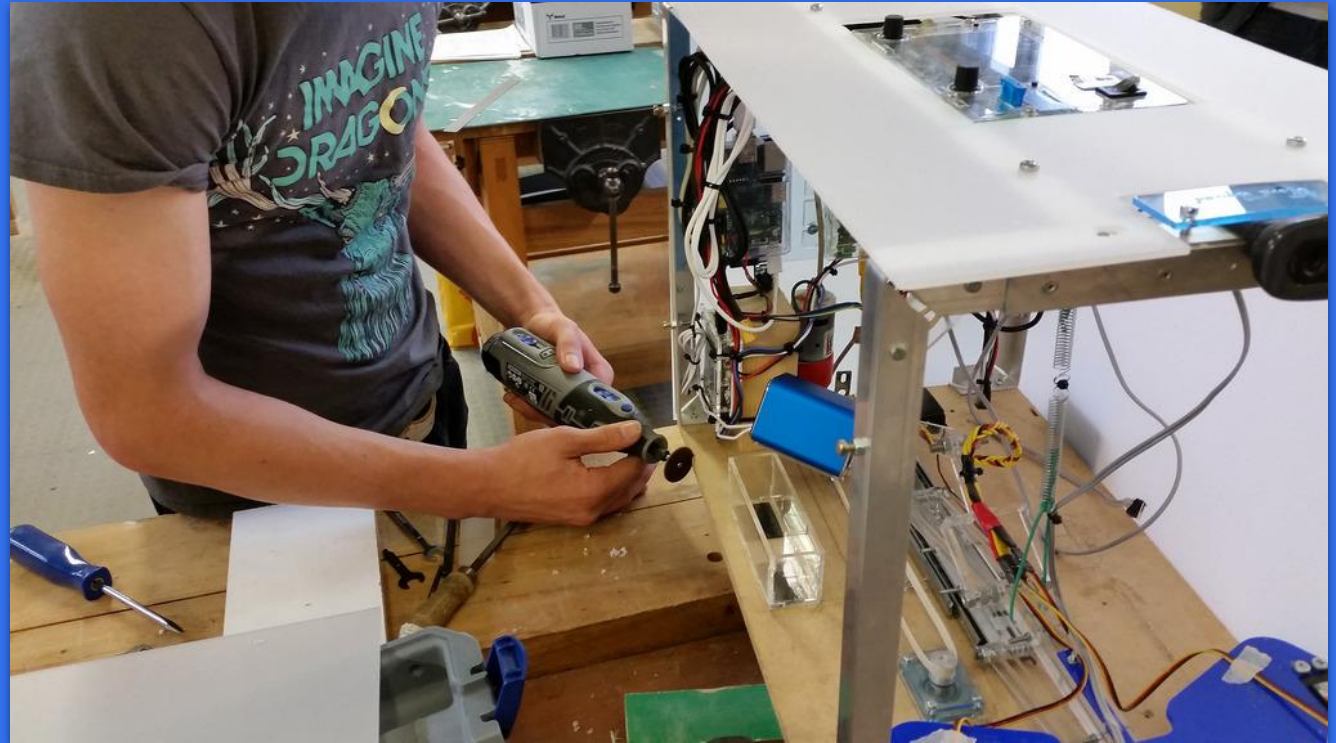
# Design



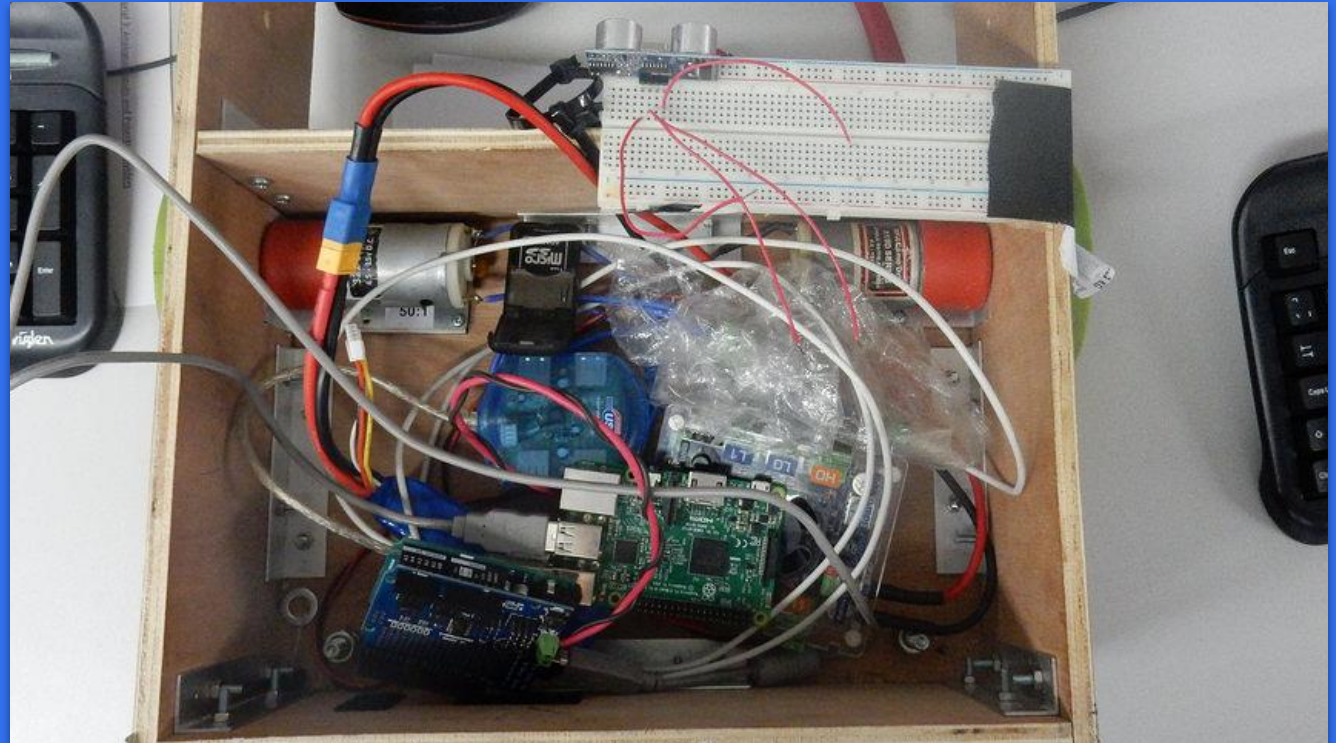
# Prototype



# Build



# Do all the electronics (Hopefully better than this)



# Write lots of code



# Work as a team



\* Work as a team



Test it a *bajillion* times





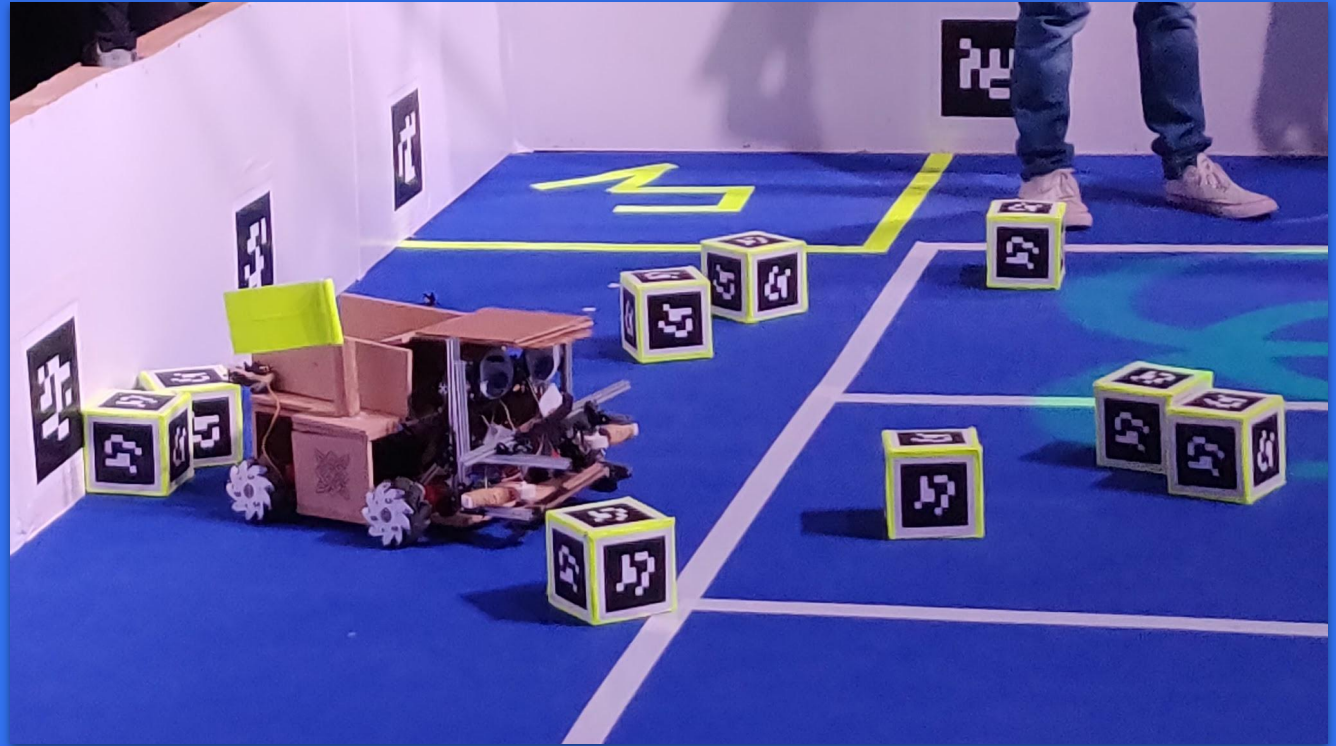
# Get your robot inspected



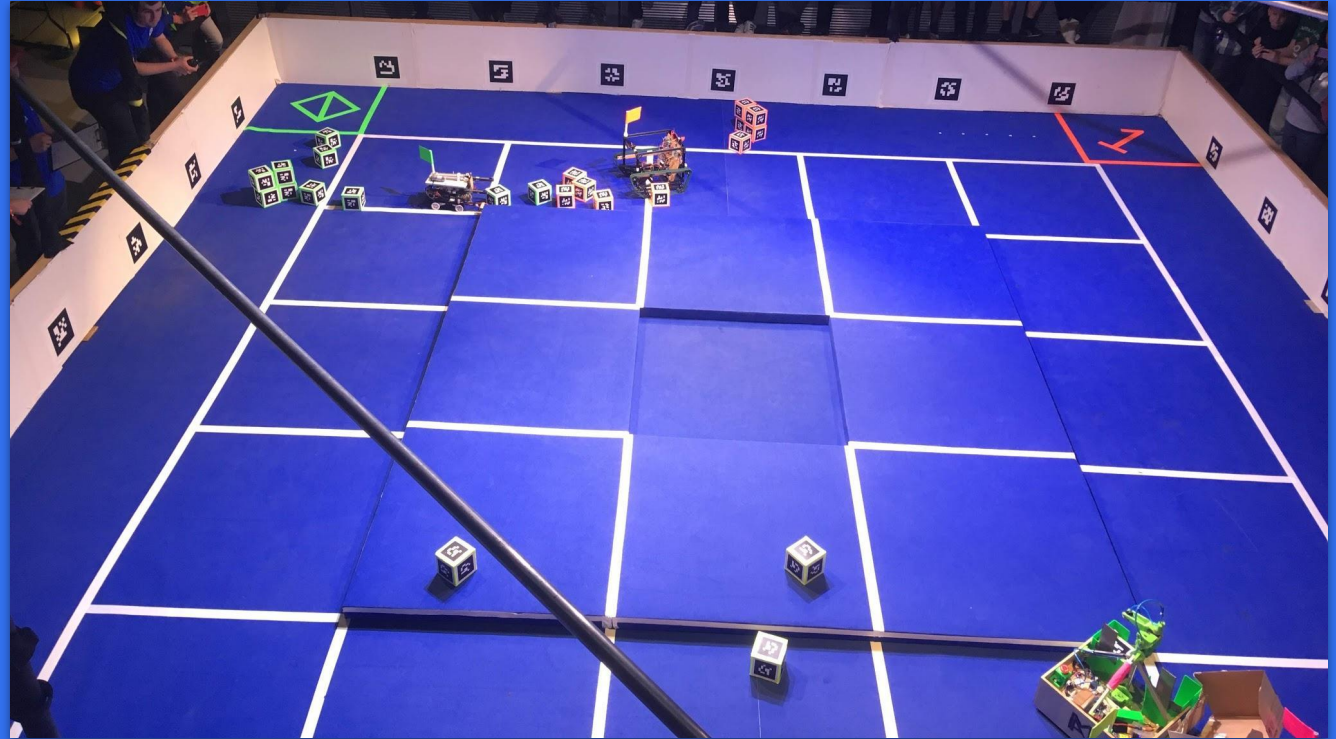
Compete,



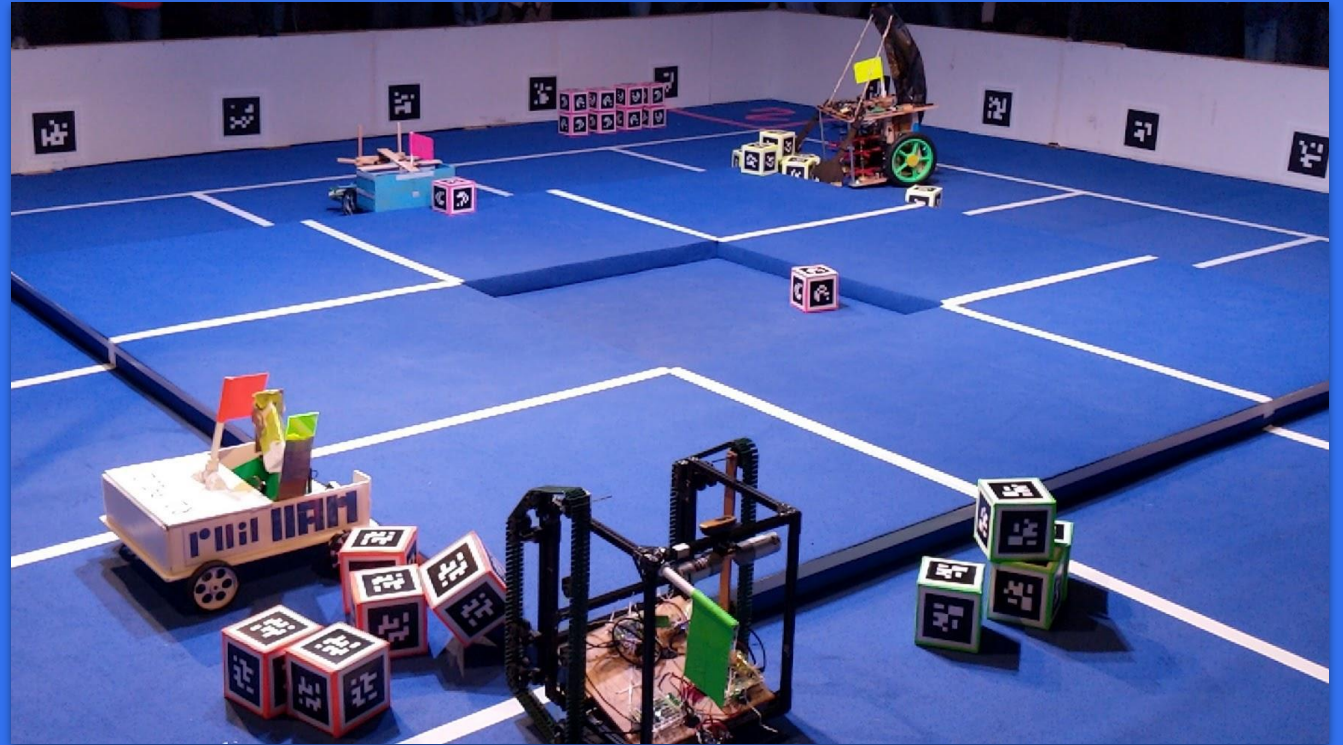
Compete some more,



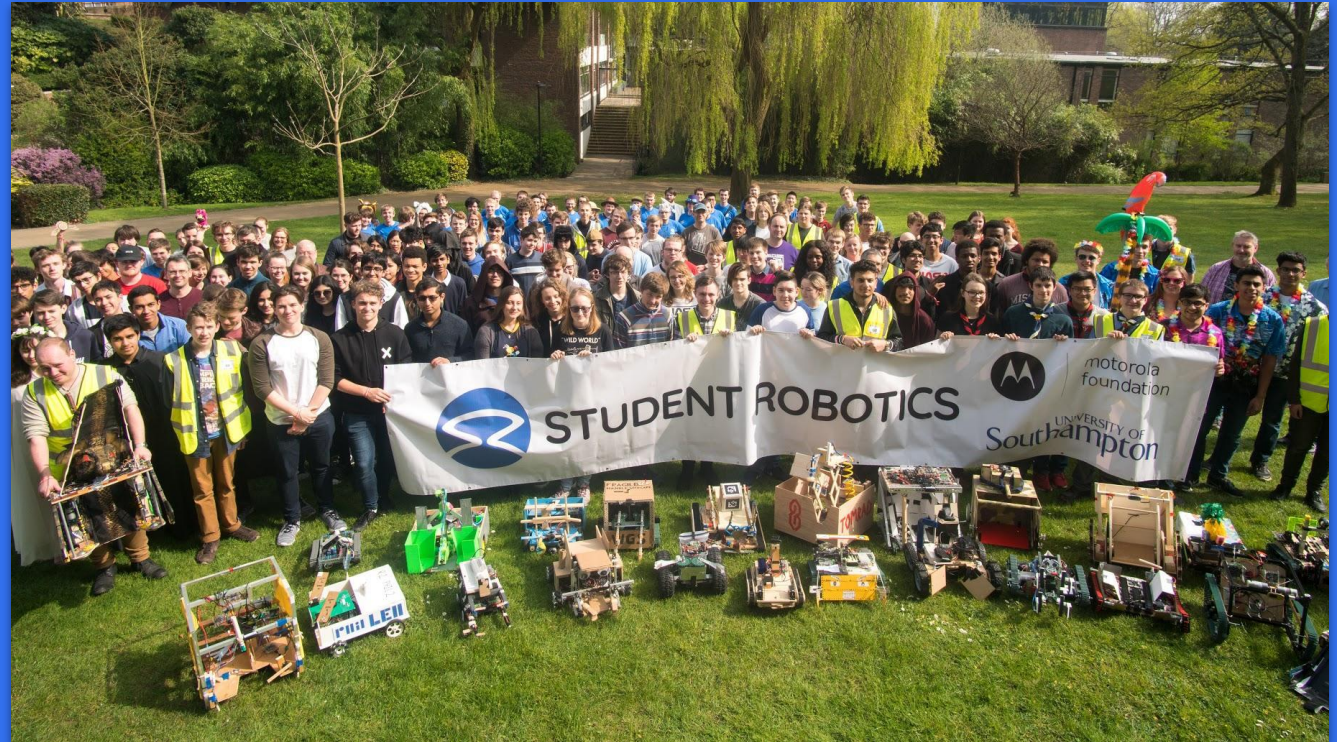
Compete *even* more!



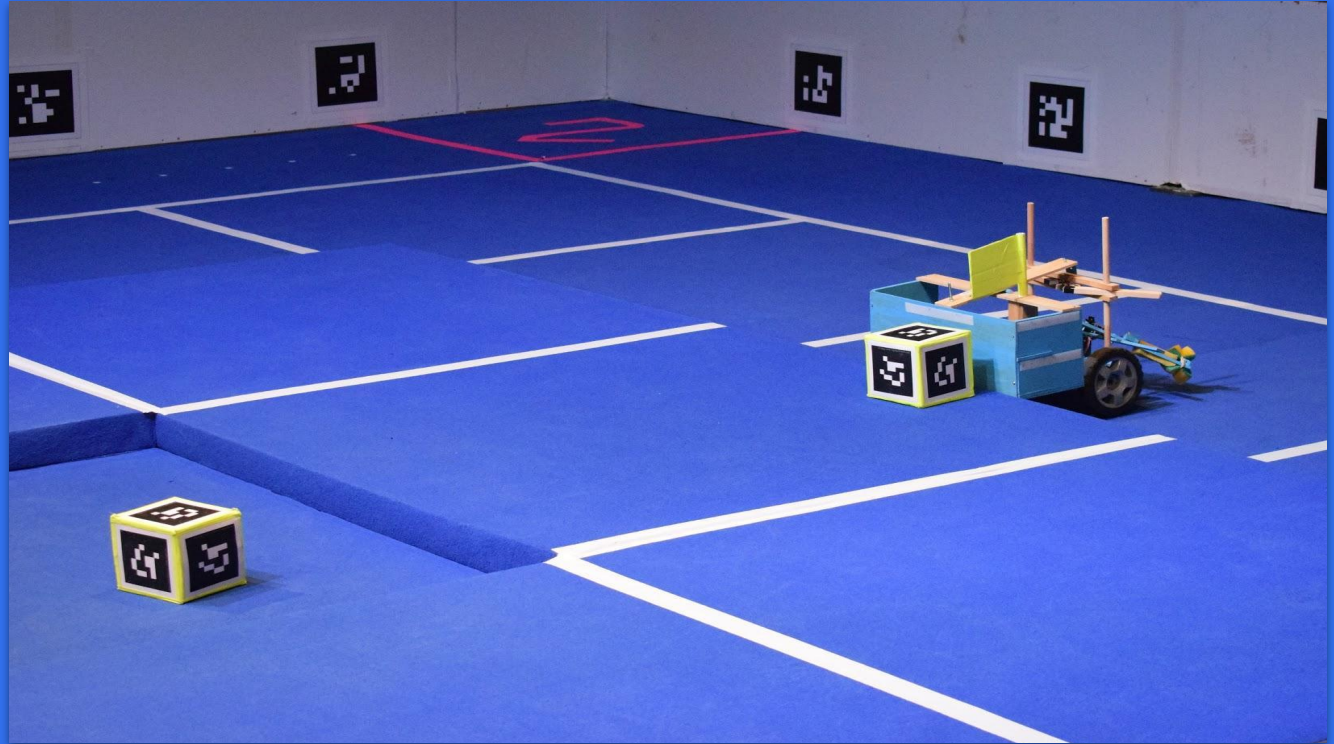
# Meet other robots



# Meet other people



# Score some points

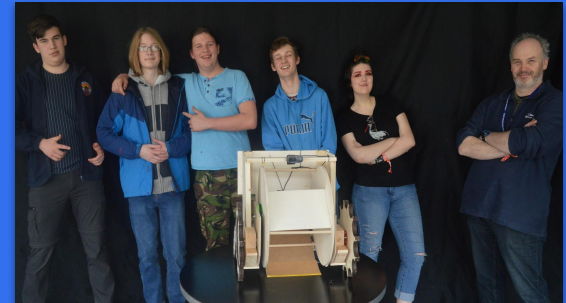
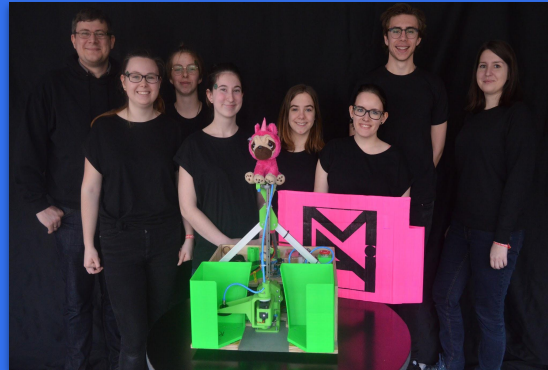
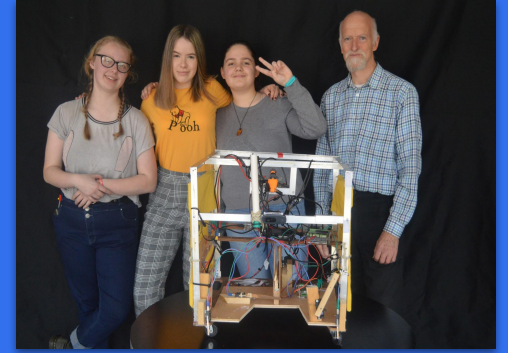
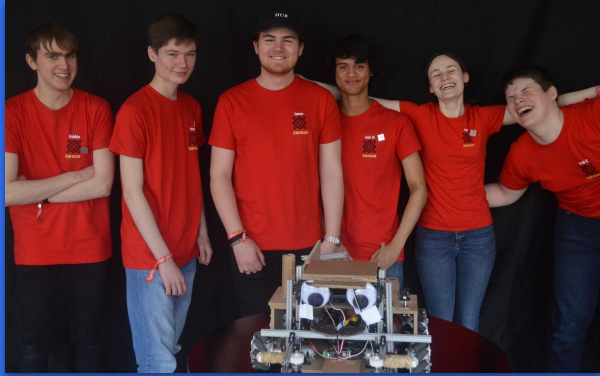


# Win some prizes

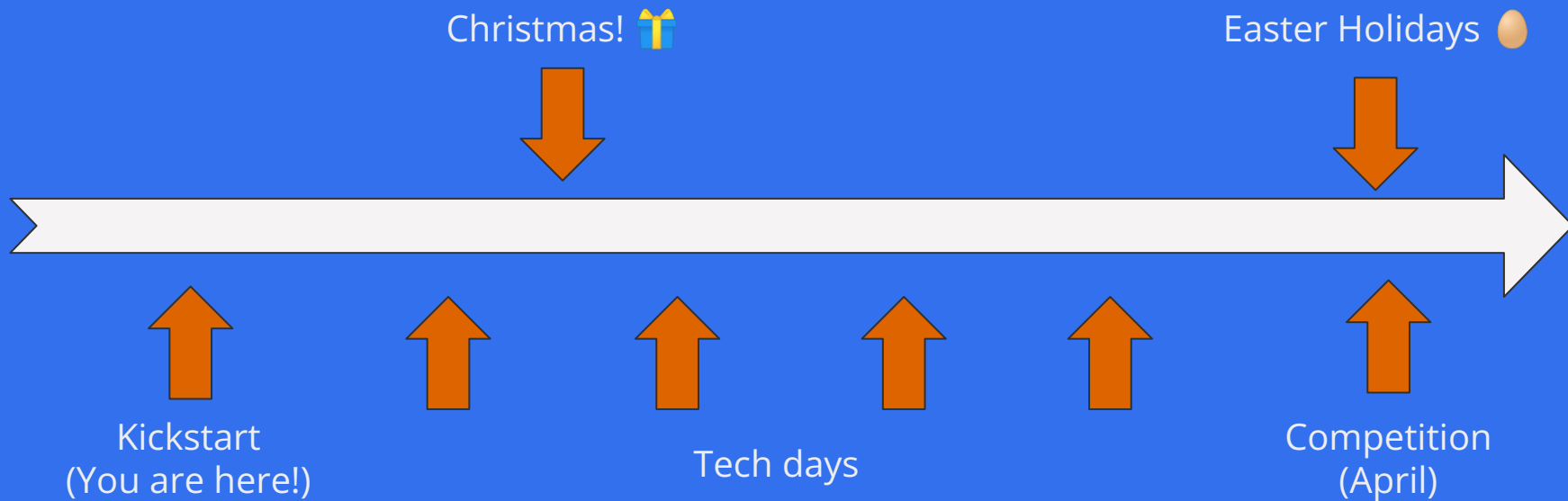


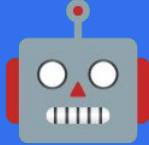


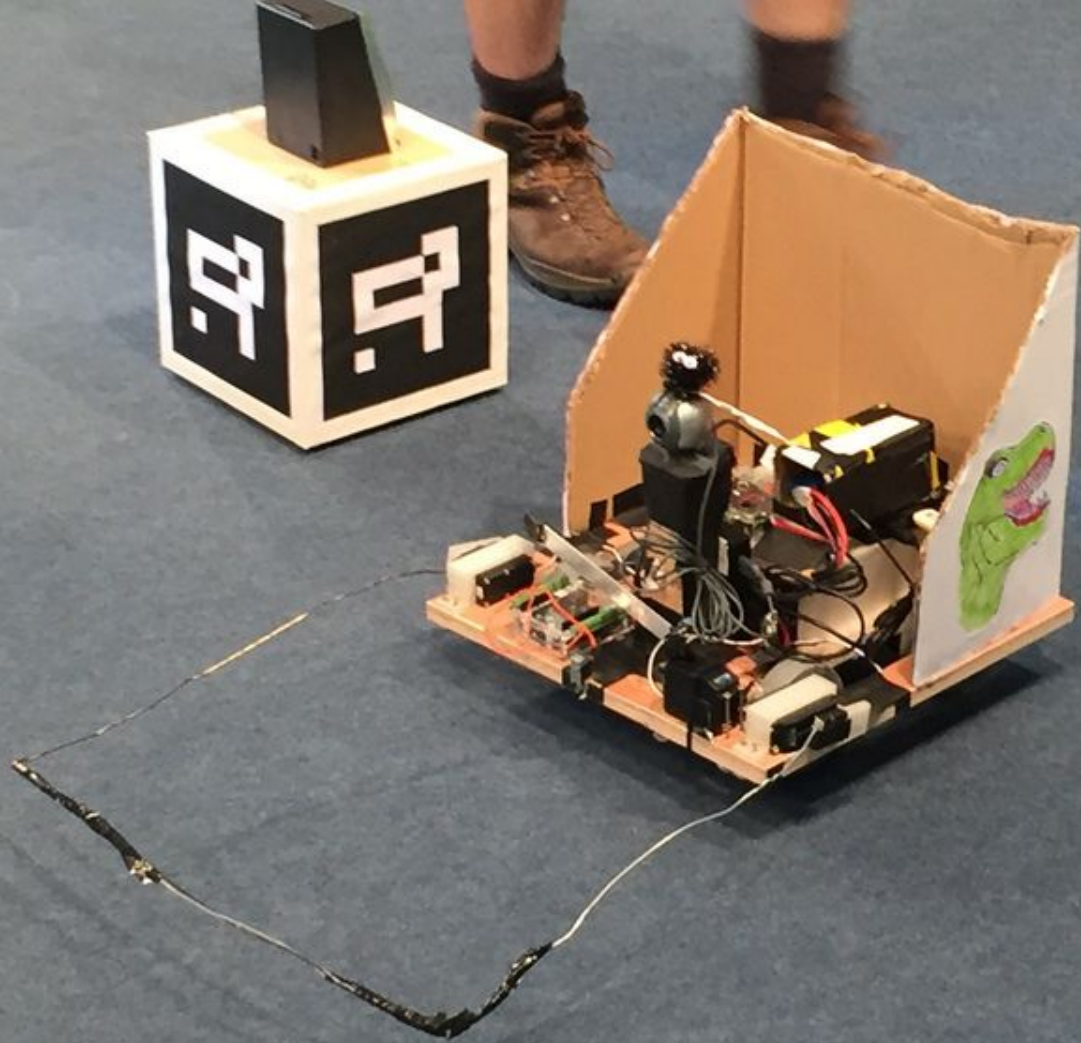
# Have fun!



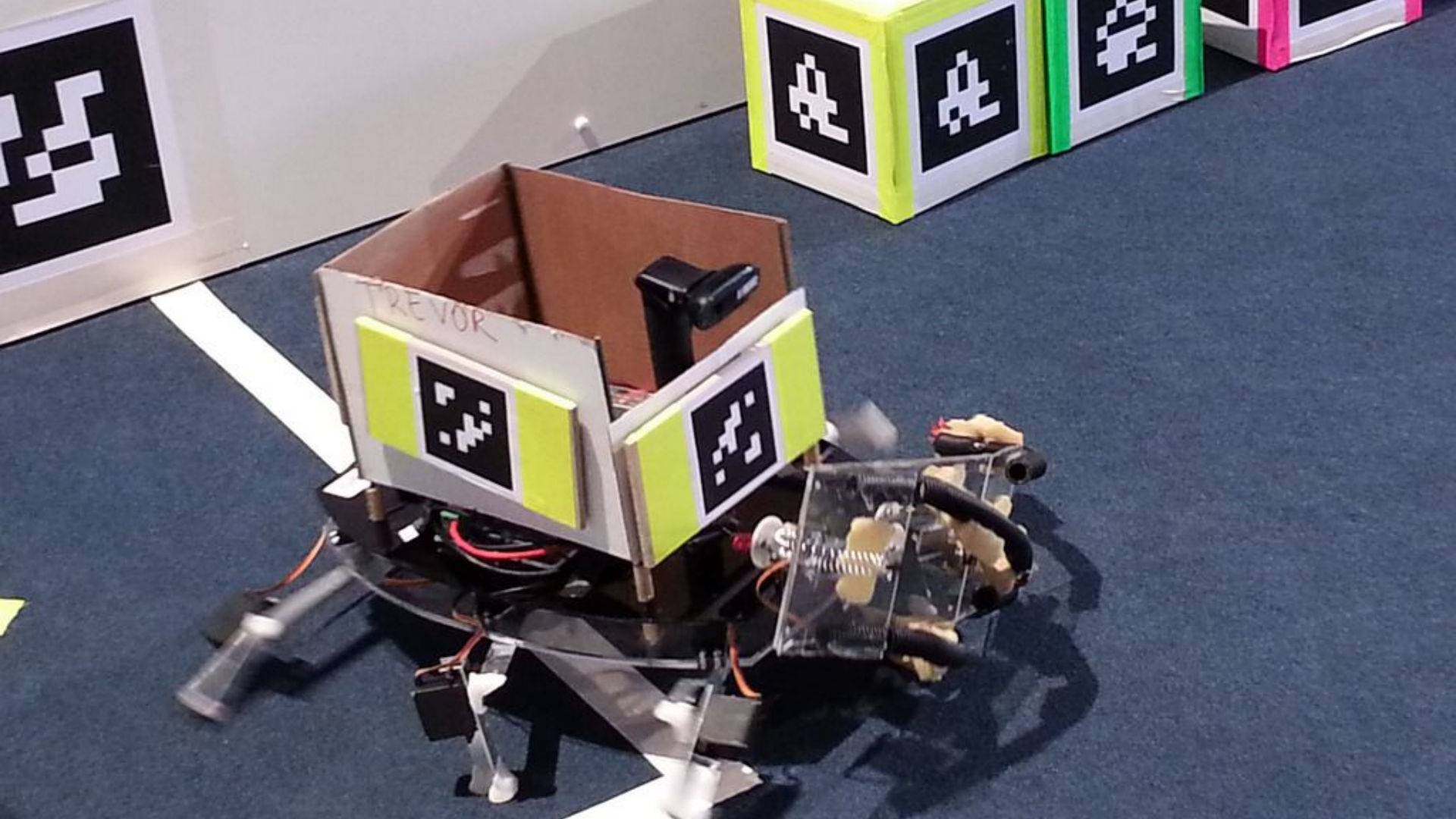
# Schedule for the year

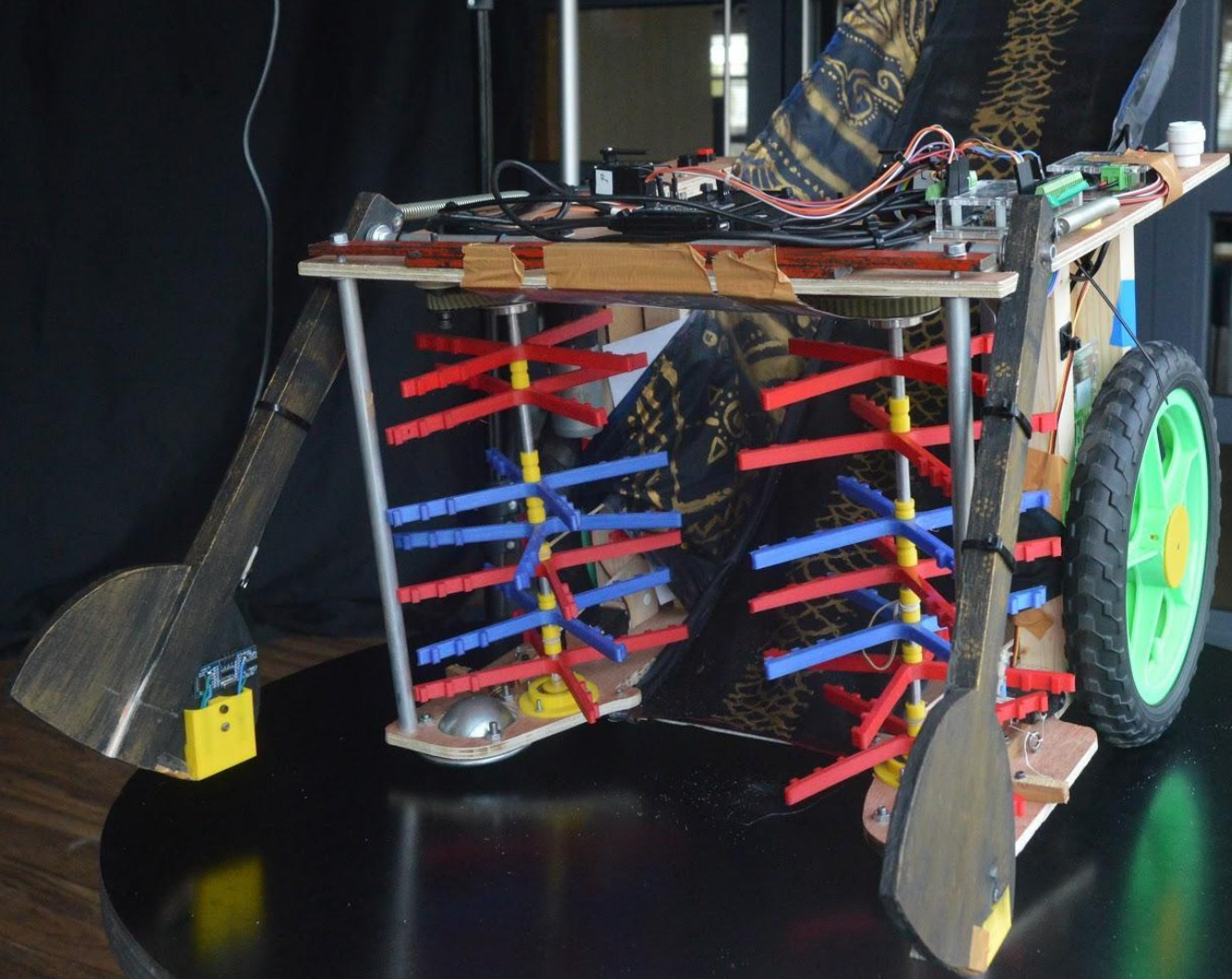


What does a  look like?









# Design Tips





# Design Tips

- **Read the rules!**
- Movement
- Exposed Mechanisms
- Servos
- Couplings
- Size
- Tooling
- Sensors

# Design Tips

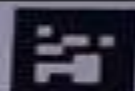
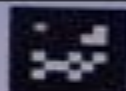
## Sensors

- Vision
- Bump Sensor
- Light gates
- Potentiometer
- Wheel Encoders
- Accelerometer
- Gyroscope

# Design Tips

## Electronics

- Where do your electronics go?
- How long should the wires be?
- Start/Stop button needs to be accessible
- USB stick(s) needs to be accessible
- Battery needs protecting



# Recommended Steps

1. Make a test base ASAP
2. Think about
  - Mechanics
  - Sensors
  - Game strategy
3. Iterate
  - Small improvements
  - Keep it working
4. Testing, lots and lots of testing

# THE KIT

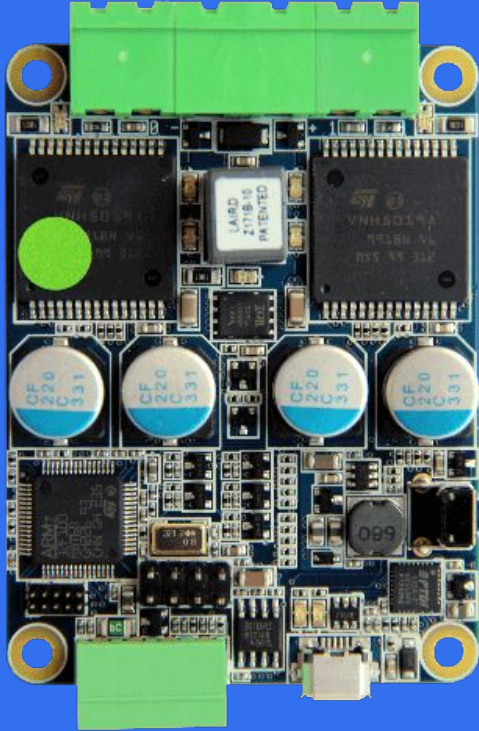
# Brain Board



*The brains of the operation*

- Controls boards
- Code runs here
- There's an update

# Motor Board

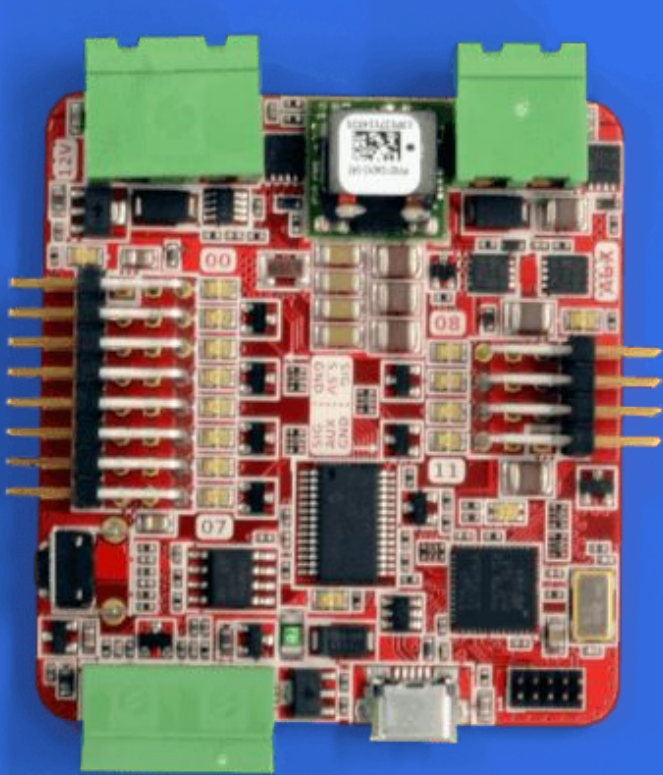


*Controls motors*

- **12V DC** motors, up to **10A**
- \* motors not included



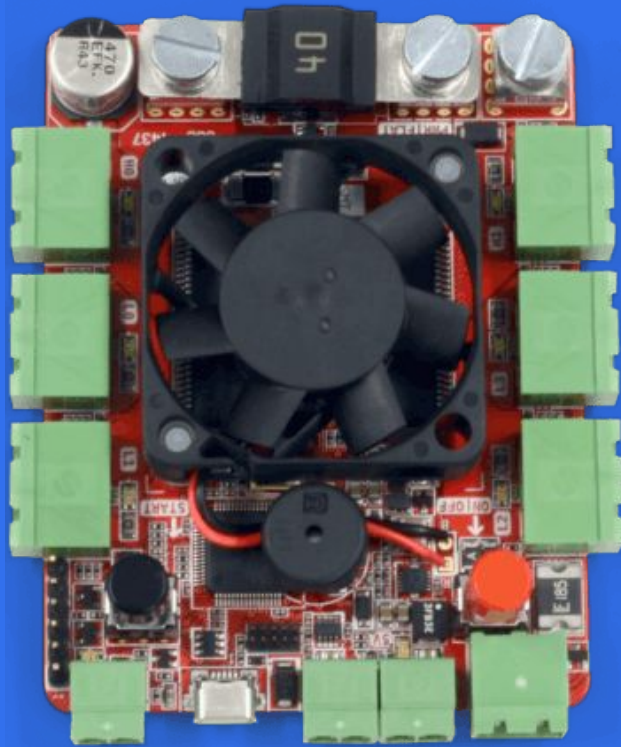
# Servo Board



*Controls servos*

- Up to 12 RC servo motors
- Careful how you load them, though!
- \*servos not included

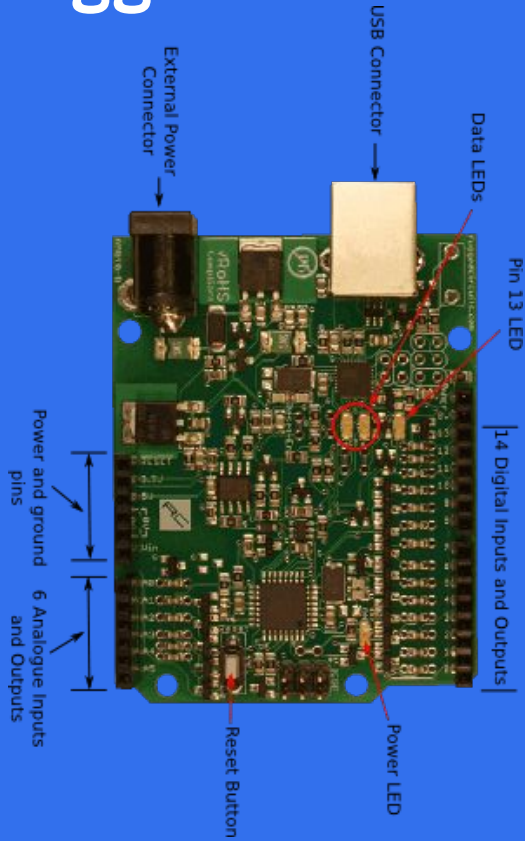
# Power Board



*POOOOWWWEEEEERRRR!*

- Power distribution
  - High-current 12V
  - Low-current 12V
  - 5V
- On | Off button
- Start button
- Buzzer

# Ruggeduino



## *General Purpose IO*

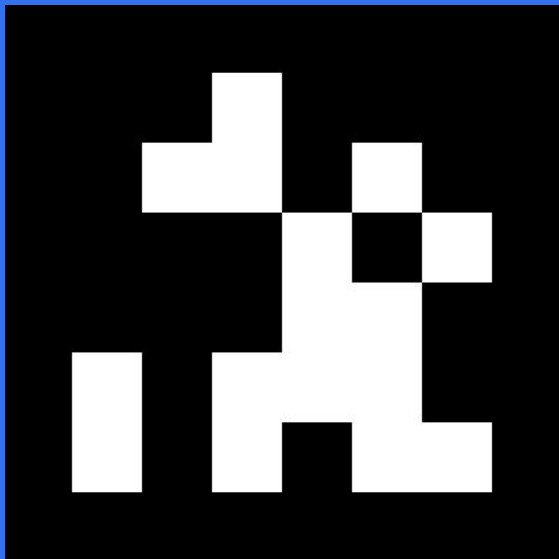
- Bump switches (Have I hit something?)
- Pressure sensors (How hard have I hit it?)
- Light gates (Have I captured something?)
- Ultrasound (How far away is something?)
- \* sensors not included

# Batteries



- Should be respected
- Follow battery charging procedure to the letter, every time (one of the microgames)
- Only ever connect to:
  - power board
  - supplied battery charger
- Protect it from mechanical damage
- Do not over-discharge
- If you're unsure, **read the docs!**

# Vision



- On Arena walls
- Properties:
  - Type
  - ID
  - Distance from webcam
  - Position relative to webcam
  - Orientation

**YOUR CODE**

# Your Code

- Python 3.9
- `from sr.robot3 import *`
- Local Development
  - Backups!
  - Distributed team
- `robot.zip`

## DOCUMENTATION

# Read The Docs!

They're really useful!

## Introduction

## Kits

- Assembly
- Batteries
  - HKE4 Charger
  - IMAX B6 Charger
- Brain Board
- Motor Board
- Power Board
- Ruggeduino
- Servo Board
- WiFi
- Safety Regulations

## Programming

- Python
  - Functions
  - Libraries
- SR
  - API Quick Reference
  - Motors
  - Power
  - Ruggeduinos
    - Custom Firmware
  - Servos
  - Vision
  - Markers
- Code Editors
  - VSCode

## Rules

- Game Rules Archive

## Troubleshooting

- Python
- Interactive Troubleshooter

## Tutorials

- Basic Motor Control
- SR2021 Microgames
- Python

## Team Admin

- Discord Server

## INTRODUCTION

There are a number of sections in the documentation, offering help for the [kit](#) and [programming](#). Under the [tutorials](#) section, a number of these things are combined to help you understand what you can, or need, to do. Navigation of the documentation can be done using the column to the left, where everything is arranged alphabetically in the aforementioned sub-sections.

Within this documentation, you will come across a number of boxes like this:

```
# code example
```

These are code examples provided to help you.

From time to time, you may come across some warnings such as the following:

Charge Your Batteries!

It would be advisable to take note of these, especially that one! You will also come across some blue boxes providing information, similar to the following:

Some useful information... like the information given in the information box above.



[studentrobotics.org/docs](https://studentrobotics.org/docs)

Our documentation

# Discord

- Communicate with us and your fellow teams
- Get support
- Share tricks
- Brag about how good your team is!

# HEALTH AND SAFETY



# Health and Safety

- How easy is it to turn off
- If we pick it up, can it hurt us?
- Is the wiring messy or loose?
  - Colour code your wiring!
- Is the kit loose?
- Is the battery protected?
- Is the power button accessible?

# General Tips

Need some help?

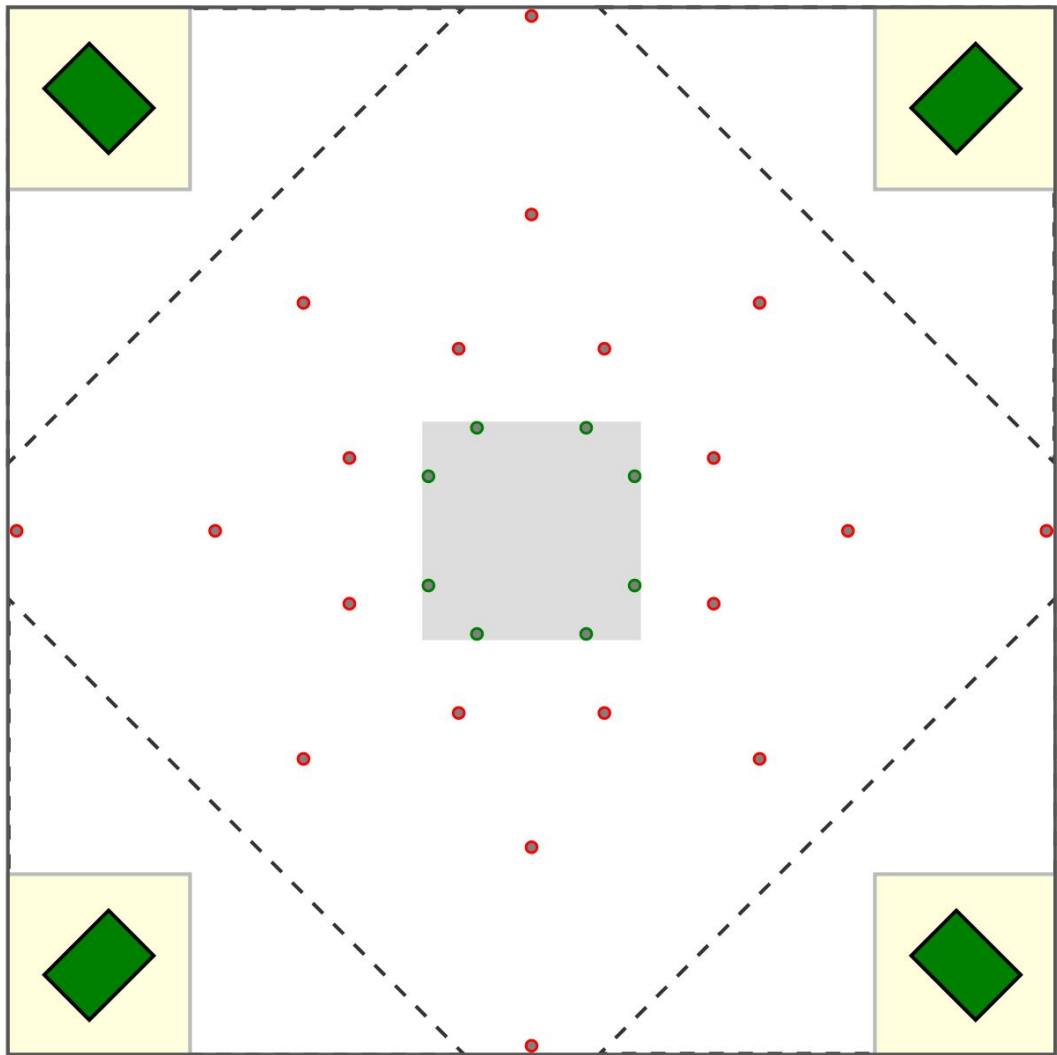
- Volunteers
- Tech Days
- Discord
- Sharing knowledge
- Keep it simple
- Prototype early, and often

# THE GAME?

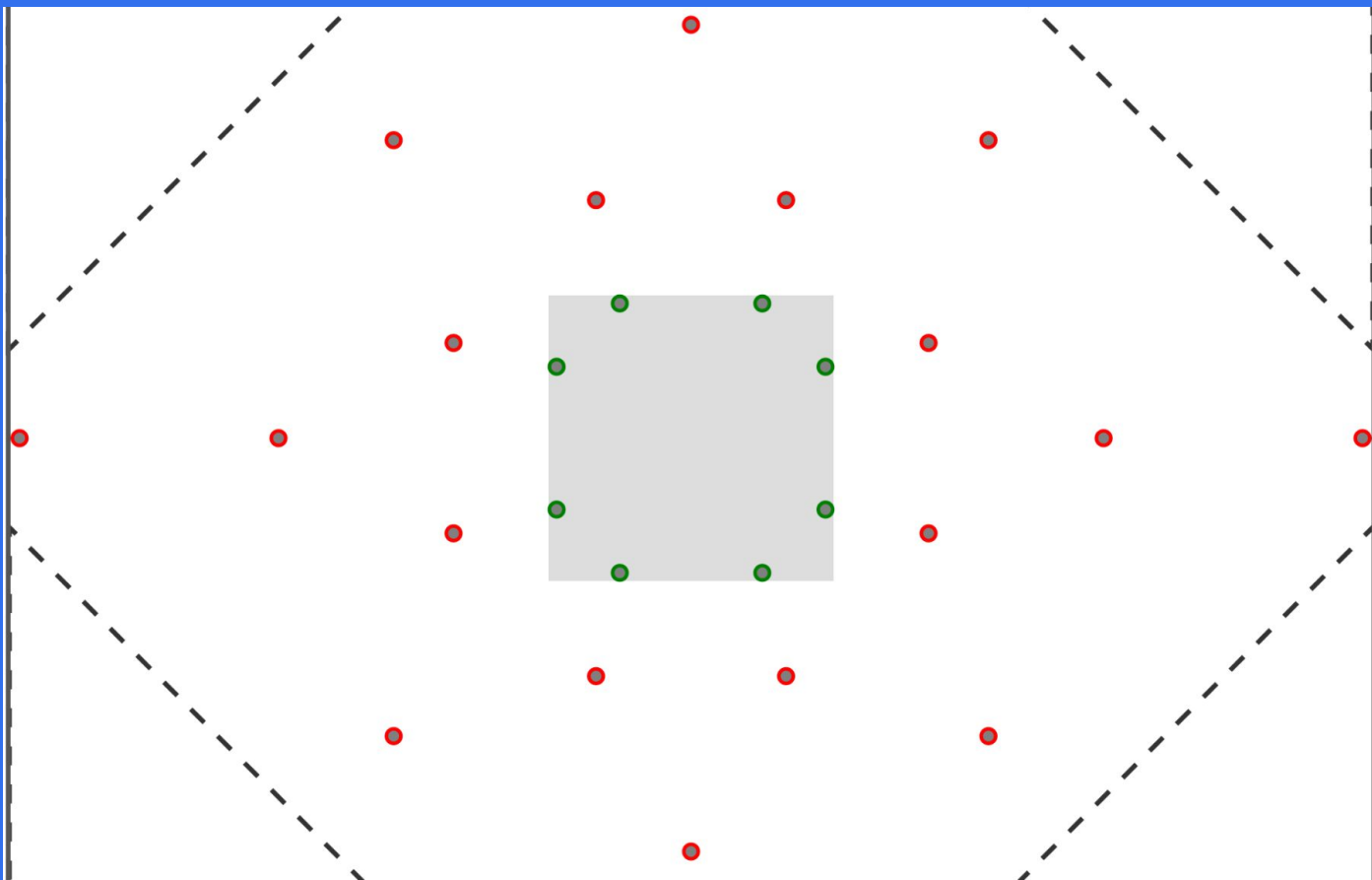
The moment you've all been waiting for!

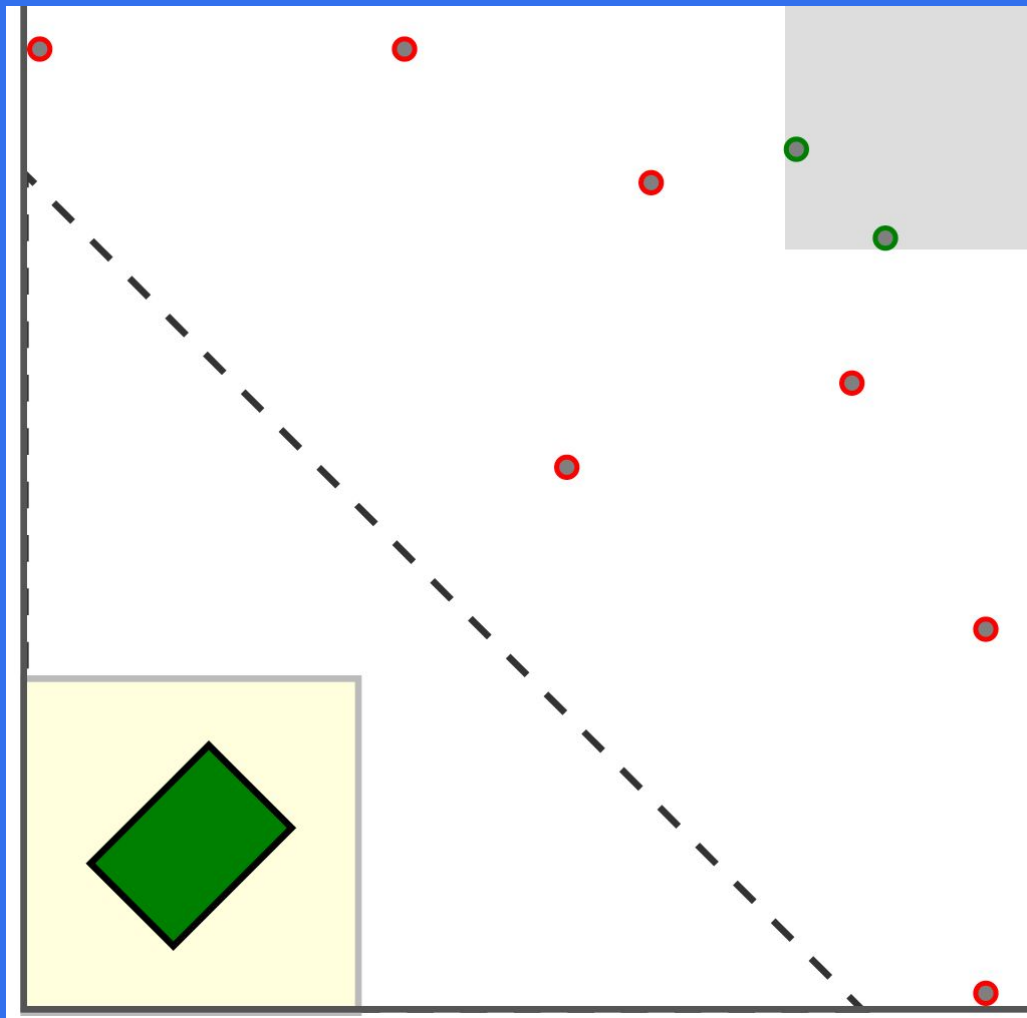
This Way Up

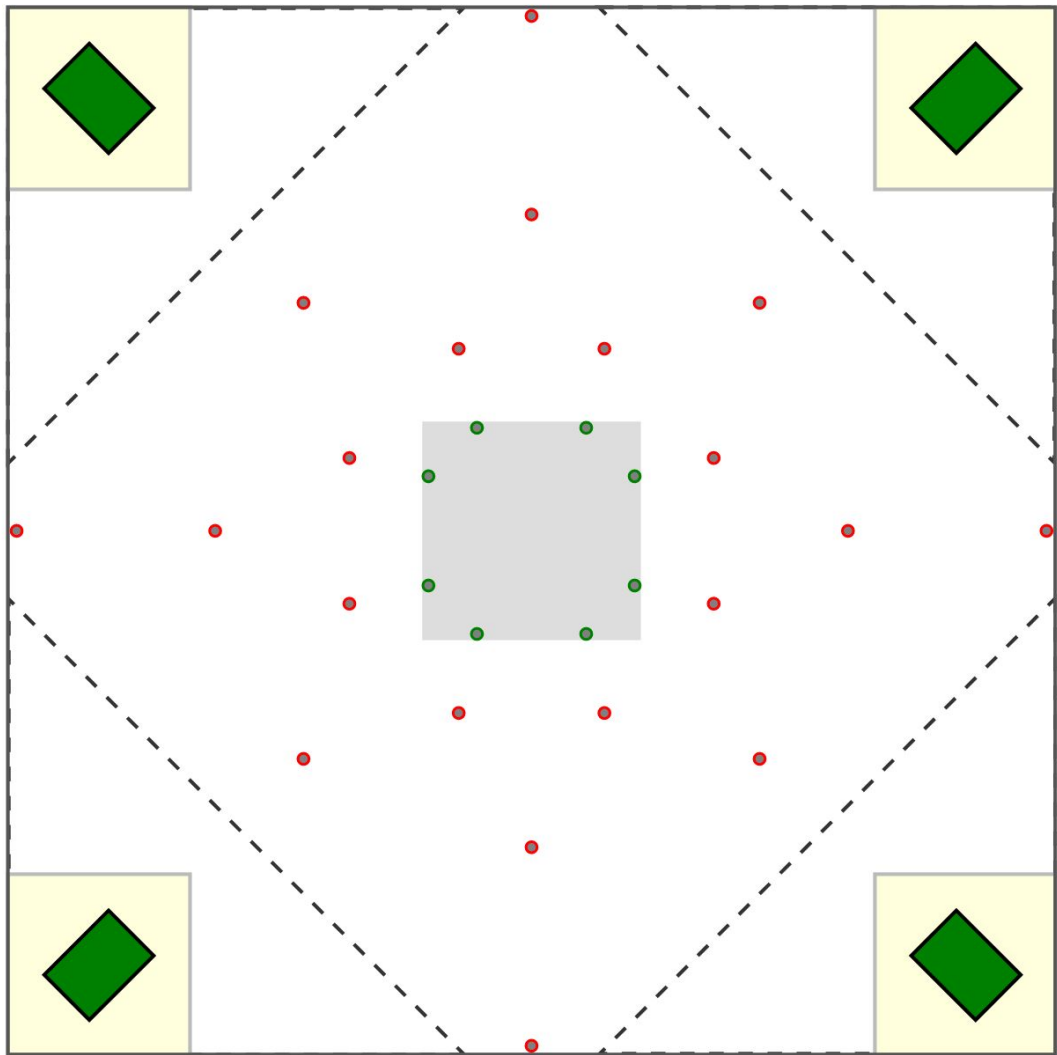












# The Rules

Read them!

They're **very** helpful!

## THIS WAY UP

### TABLE OF CONTENTS

1. [Game Rules](#)
2. [Regulations](#)
3. [Specifications](#)
4. [Competition Structure](#)
5. [Awards](#)
6. [Revisions](#)

### GAME RULES

1. The objective of the game, called **This Way Up**, is to capture the most correctly-oriented cans.
2. Before a match begins, participating teams must:
  - Present their robot in the staging area, adjacent to the arena, before the scheduled close of staging time. The staging area will be clearly marked on the day.
  - Attach a **robot flag**. Robot flags will be provided by Student Robotics officials in the staging area.
  - Place their robot in the starting area that they are assigned. The robot must be placed such that it is entirely within this starting area, with no parts overhanging its boundary. Its orientation does not matter.
  - Vacate the arena 40 seconds before the scheduled start time. During the 40 second period prior to the start of the match there must be no interaction with the robot.
  - Follow the directions of the match officials.Teams that fail to comply with these rules—such as by arriving late—may forfeit the match, at the discretion of the judge.
3. The game is played between **four** robots.
4. Each match lasts for **150** seconds.
5. Robots will be started by, or at the direction of, match officials.
6. There are 28 cans in the arena at the start of each match.
7. Cans on the arena floor start upside-down. Cans on the raised platform start in the correct orientation.
8. Each can in a teams' scoring zone is worth:
  - 0 game points if it is on its rolling edge,
  - 1 game point if it is upside down,
  - 3 game points if it is the correct way up.
9. A can is "in" a scoring zone if either:
  - any part of it is in contact with the floor in the zone,
  - the can is in contact only with other cans which are in the zone.
10. There is a bonus point available for a robot fully leaving its scoring zone for the first time in a game.
11. Robots start inside their scoring zone.
12. At the end of the match the robot with the most points wins.
13. The arena is a square of the design specified in [the specifications section](#).
14. A match may be terminated prematurely if all teams participating in that match state to the match officials that they are happy for the game to end.

# PRIZES

They're what points mean!



**First** Place

Second Place

**Third** Place

Obviously!

# First Movement Award

Video of a moving robot from a rookie team

# Rookie Award

Highest placed rookie in the league



# Robot and Team Image

For those robots who are looking *sharp*!

# Online Presence

For those teams who are active online

#srobo2022

# Committee Award

For ingenuity & elegance in robot design

# Microgames

- Get familiar with your kit through a series of challenges
- Kit part (for those with kits)
- Simulator part
- Found in the docs
- Team supervisors have the answers
  - As do we on Discord



**ANY QUESTIONS?**



**GOOD LUCK!**



**@studentrobotics**



**@student\_robotics**



**@studentrobotics**